

METHOD AND DEVICE FOR MANUFACTURING SEMICONDUCTOR DEVICE

特許公報番号 JP1225117 (A)
公報発行日 1989-09-08
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分類:
一国際: H01L29/73; H01L21/265; H01L21/331; H01L29/66; H01L21/02; (IPC1-7): H01L21/265; H01L29/72
一欧州: H01L21/265A2
出願番号 JP19880050961 19880304
優先権主張番号: JP19880050961 19880304

要約 JP 1225117 (A)

PURPOSE: To form the shallow impurity distribution of boron to a sample by using a specific raw material for ion implantation and ion-implanting the molecules or cluster ions of boron or of boron and hydrogen to the sample. **CONSTITUTION:** A borane or its derivatives are employed as an ion implantation raw material. The molecules or cluster ions of boron, such as B₄H, B₅H, B₅H, B₁₀H, B₁₀H, etc., or of boron and hydrogen are formed while being made to differ from a raw material gas such as a conventional boron fluoride (BF₃) gas or other solid raw materials, and ion-implanted to a sample. Accordingly, a high-concentration P-type layer can be shaped in a shallow region of several hundred Angstrom or less in the sample, and an extremely thin base layer is acquired when the title method is applied for forming a base in an N-P-N transistor, thus attaining the increase of working speed.

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SEMICONDUCTOR DEVICE AND MANUFACTURE THEREOF

特許公報番号 JP3129774 (A)
 公報発行日 1991-06-03
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 分類:
 一国際: H01L29/78; H01L21/8238; H01L27/092; H01L29/66; H01L21/70; H01L27/085; (IPC1-7): H01L27/092; H01L29/784
 一欧州:
 出願番号 JP19890314438 19891205
 優先権主張番号: JP19890184409 19890717

他の公開

JP2889295 (B2)

要約 JP 3129774 (A)

PURPOSE: To enhance breakdown strength of gate and to prevent lowering of mobility of carrier by specifying the concentration of nitrogen atom in the vicinity of interface between a gate insulating film and a semiconductor layer. **CONSTITUTION:** In a semiconductor device comprising gate electrodes 54, 55 formed on a semiconductor layer of one conductivity through a gate insulating film 43 and source/drain regions of reverse conductivity formed at the opposite sides of the gate electrode, the gate insulating film 43 is formed such that the concentration of nitrogen atom in the vicinity of the interface to the semiconductor layer is equal to or higher than 1atom.% while lower than 10atom.%. Preferably, the oxide film 43 is as thick as a gate oxide film 42 or thinner than half of the thickness of the gate oxide film 42.; It is because a thick oxide film 43 causes considerable deformation of the gate electrode to provide a bird beak below the electrode, whereas a thinner gate oxide film 43 can not feed sufficient nitrogen into an oxide film below the gate electrode. Upon finish of oxide film forming process, heating with lamp is carried out for 60sec at a temperature of 1050 deg.C in an environment containing such gas as ammonia, which contains nitrogen atoms, thus forming an after oxide film 44 containing nitrogen.

